

OBSERVATIONS ON THE MENTALITY OF CHIMPANZEES AND ORANG-UTANS.

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When in the course of un-human events some years ago in Borneo, I became acquainted with several members of the genus Wild-man that made the island famous, I was possessed with the idea that with constant human companionship and surroundings at an early age, these anthropoid apes—the orang-utan (which of course you know is a Malay name meaning Wild-man or Man of the Jungle)—were capable of being developed to a grade of human understanding perhaps only a step below the level of the most primitive type of human being inhabiting the island—I mean the wandering tribe of Punans. If deaf, dumb and blind children have been taught by beings they could not see to use language they could not hear would one not be justified in an earnest endeavor to teach the higher apes with faculties and senses alert and with traditional powers of imitation, to do the same to a limited degree? It seems well nigh incredible that in animals otherwise so close to us physically there should not be a rudimentary speech center in the brain which only needed development. I have made an earnest endeavor and am still endeavoring, but I cannot say that I am encouraged.

I took as my pupils, or patients, whichever it may please you to consider them, the orang-utan of Borneo and the chimpanzee of Africa. The other anthropoids, the gibbon and the gorilla, are exceedingly difficult to keep in captivity; the gibbon is very frail and the gorilla, animal dealers declare, soon succumbs to homesickness.

My first orang-utan I obtained in February, 1909, in South Borneo, when it was, as well as I could estimate, about one year old; it still had all its milk teeth. It had been in captivity only a week and yet it was as docile as a human baby and never attempted

to bite. It survived four years and eight months. I obtained another orang in 1911, which lived two and a half years in captivity, but although gentle and affectionate it absolutely refused to be educated.

Two chimpanzees, each about a year old, absolutely untrained, I bought from Cross, the animal dealer, in Liverpool in the autumn of 1909. The first one died of pneumonia at the end of five months when her intellect, which showed great promise, was just awakening. The second, which was imported for Dr. Witmer, spent her first months in this country at his laboratory of psychology at the university. After a severe attack of pneumonia she came out to my place to convalesce in company with my orang-utans; she has been with me ever since and is the sole survivor of my four pupils. (I mention these dry facts merely to indicate the material I have worked with, the approximate ages of my pupils and the somewhat limited extent of my experience. Frequently for weeks at a time I have spent as much as six hours a day in their company, but this is not one hundredth part enough.)

In teaching articulate speech I found the first difficulty to be overcome in both the orang and the chimpanzee is their lack of use of lips or tongue in making their natural emotional cries. These natural cries are almost entirely, I think I may say, head tones—shrieks, squeals, or grunts, made for the greater part on inspiration. They unquestionably have, however, distinctly different sounds to indicate their simple emotions of fear, anger and joy. The orang in one respect does use the lips, to make a sound indicating warning or apprehension; this sound is made with the lips pursed up and the air sucked through them—an exaggerated and prolonged kissing sound, followed by a grunting expiration and inspiration. Strange to say, the chimpanzee seems to appreciate on hearing this sound that danger is near, although it never makes this sound itself. When uttering this warning, the hair of the head and shoulders bristles up, but there is no showing of teeth or other signs of aggression. My oldest orang would make this sound on command (I had merely to say "What is the funny sound you make when you are frightened?"). Their expression of pleasure, as I have heard it, is several high-pitched squeaks made with the lips closed. Their ex-

clamation of anger is a deep toned guttural grunt or bark much like that of an angry hog; I have heard this from the young orang-utan and from the full-grown just recently captured.

The chimpanzee indication of fear is a quick, high-pitched shriek and a bark very like a dog. The exclamation of joy is really much like laughter. The mouth is opened wide and the sound made is a long drawn ah-a-a, with a rising inflection, this is followed by three or four short, quick Ahs. A sound of greeting and friendliness is a series of *OOs* made by rapid expiration and inspiration, and with lips protruded, merely for the projection of the sound. My chimpanzee when greeting friends at a distance amplifies this sound into more or less of a shout of long-drawn high-pitched notes, which when once started, apparently, must be kept up to a logical conclusion; I have been impelled on many occasions to put my hand over her mouth to subdue the noise but the shout will still continue forced through my fingers while she looks up at me compassionately as one having no ear for melody. Contentment over food seems to be expressed by grunts very much like a young pig.

If these animals have a language it is restricted to a very few sounds of a general emotional signification. Articulate speech they have none and communication with one another is accomplished by vocal sounds to no greater extent than it is by dogs, with a growl, a whine, or a bark. They are, however, capable to a surprising degree of acquiring an understanding of human speech.

In the case of the orang-utan it took at least six months of daily training to teach her to say "Papa." This word was selected not only because it is a very primitive sound, but also because it combined two elements of vocalization to which orang-utans and chimpanzees are, as I have said, unaccustomed, namely: the use of lips and an expired vowel sound. The training consisted of a repetition of the sounds for minutes at a time, while the ape's lips were brought together and opened in imitation of the movements of my lips. I also went through these same maneuvers facing a mirror with her face close to mine that she might see what her lips were to do as well as feel the movement of them. At the end of about six months, one day of her own accord, out of lesson time, she said "Papa" quite distinctly and repeated it on command. Of course, I

praised and petted her enthusiastically; she never forgot it after that and finally recognized it as my name. When asked "Where is Papa?" she would at once point to me or pat me on the shoulder. One warm summer's day I carried her in my arms into a swimming pool; she was alarmed at first but when the water came up to her legs she was panic stricken; she clung with her arms about my neck; kissed me again and again and kept saying "Papa! Papa! Papa!" Of course, I went no further after that pathetic appeal.

The next word I attempted to teach her to say was "cup." (Let me say that by this time she understood almost everything that it was necessary for me to say such as "Open your mouth," "Stick out your tongue," "Do this," etc., and she was perfectly gentle and occasionally seemed quite interested.) The first move in teaching her to say cup was to push her tongue back in her throat as if she were to make the sound "ka." This was done by means of a bone spatula with which I pressed lightly on the center of her tongue. When I saw that she had taken a full breath I placed my finger over her nose to make her try to breathe through her mouth. The spatula was then quickly withdrawn and inevitably she made the sound "ka." All the while facing her I held my mouth open with my tongue in the same position as hers so that her observation, curiosity, and powers of imitation might aid her, and I said *ka* with her emphatically as I released her tongue. After several lessons of, perhaps, fifteen minutes of this sort of training each day she would draw back her tongue to the position even before the spatula had touched it, but she would not say *ka* unless I placed my finger over her nose. The next advance was that she herself placed my finger over her nose and then said *ka* without any use of the spatula; then she found that in default of my finger her own would answer the purpose and I could get her to make this sound any time I asked her to. It was comparatively very easy from this to teach her to say "*kap*" by means of closing her lips with my fingers the instant she said *ka*. At the same time I showed her the cup that she drank out of and I repeated the word several times as I touched it to her lips. After a few lessons when I showed her the cup and asked "What is this?" she would say cup very plainly. Once when ill at night she leaned out of her hammock and said "cup, cup, cup,"

which I naturally understood to mean that she was thirsty and which proved to be the case. I think this showed fairly conclusively that there was a glimmering idea of the connection of the word with the object and with her desire.

By getting her to stick out her tongue and then by holding the tip of it up against her teeth and at the same time forcing her to breathe through her mouth I finally got her to make the sound *Th*. This was preliminary to teaching the words: *the, this, that*.

All this was encouraging I will admit but then—"I never nursed a dear gazelle . . .," etc.; the poor little animal died four or five months after this first tiny inkling of language. I have tried persistently for five years to teach my surviving chimpanzee pupil to say "mama"; she says it, but very poorly. I think I must honestly say it is a failure. Again and again I have tried by the same method that I used with the orang-utan to teach her to say *cup*, but to no avail. On the whole I should say that the orang holds out more promise as a conversationalist than does the chimpanzee; it is more patient, less excitable, and seems to take instruction more kindly.

As to a comprehension of the connection of spoken words with objects and actions both the orang-utan and chimpanzee, I think, exceed any of our domestic animals; both of my anthropoids have been able to understand what is said to them, more intelligently than any professionally trained animals I have ever seen. In their education the enticement of food has never been used as an incentive to actions, and praise and petting have been the only rewards. In other words my object has been to endeavor to make them show signs of thought rather than a perfunctory performance of tricks. The very hardest thing that I have had to contend with is inattention and lack of persistence. The slightest sound is enough to divert their minds entirely unless they are deeply interested.

Both the chimpanzee and the orang-utan possess a retentive memory for objects in connection with actions, in other words, for the association of ideas; they knew precisely the right key for every lock and padlock in their apartments and could pick them out of a bunch of ten or twelve other keys and could unfasten the lock. It was the shape and size of the key that they remembered, I am con-

vinced; they were tested with duplicate keys placed on different key rings and the right key was always selected—two of the keys were for Yale locks and hard to distinguish. On one occasion when I took Mimi, the chimpanzee, as a demonstration to one of the classes in psychology at the university she surveyed the audience assembling, possibly 125 men and women, with great interest while sitting quietly in a chair in the amphitheatre; as a group of four or five people entered at a door on the side, she turned her eyes toward them. In the group was one who had been her devoted doctor and nurse during her severe attack of pneumonia four years previously. She had not seen him since her recovery. The instant she caught sight of him she jumped from her chair, rushed to him, threw her arms around his neck, putting her face close to his and giving her shout of greeting. It was too marked a demonstration of affection to be anything short of actual recognition. There are, however, as we all know, many instances of quite as remarkable feats of memory as this among dogs and horses and possibly cats.

After an absence of six months I have found that my apes have forgotten nothing that I have taught them, although during my absence their course of instruction ceased entirely and they refused to do for others what I had taught them. Both the orang-utan and the chimpanzee have been able to learn the letters of the alphabet in order up to *M*. This is merely a demonstration of memory for different shapes in a certain sequence; the letters which I used are cut out of wood $\frac{3}{4}$ inch thick by four inches square. The chimpanzee recollects quite accurately just the sequence of these shapes in the series. By name she does not distinguish them as well, except where the letter sound is very distinct: B, F, H, L, M, seem to be easy for her to recognize whereas A, K, E, D, C, G, are confusing. When asked for the letter *I* she is apt to mistake it for her eye to which she points. When the letters are drawn the same size and width with chalk on a blackboard or printed in black on white cards she fails to recognize them. To test her ability to compare shape and size I have used an ordinary form-board consisting of ten differently shaped blocks about half an inch thick and a board wherein are cut ten hollows corresponding in size and shape to the blocks. The hollows are about $\frac{3}{8}$ inch deep and to make them more easily seen

are painted black inside. The trial consists of placing quickly all the blocks in their corresponding hollows. The actual time required by an adult human being is about twenty seconds. It is strange that with so quick a memory for the shapes of the letters and the keys she should find so much difficulty in mastering the form-board. After hundreds of trials she is never certain to get all ten blocks in place without considerable hesitation and one or two misfits. The more elaborate they are in shape the easier it appears to be for her to place them; the five point star is almost always her first selection from the pile and seldom does she hesitate over it; the equilateral cross is likewise readily placed, but the simple square, the oblong and the lozenge are invariably shifted from one hole to another all over the board. The shortest time in which she has placed them all correctly, so far, is 35 seconds; and the very next trial may have taken $2\frac{1}{2}$ minutes.

I do not wish to generalize, but from my experience with a very bright chimpanzee and an exceptionally receptive orang-utan I should say that the ability to recognize the significance of graphic representation is as lacking in the anthropoid mind as is the inclination to speak. The crudest scrawls of the cave dwellers are hundreds of centuries ahead of the simian thought. I have spent hours trying to get my anthropoids to draw two crossed lines on a black-board. If the board be placed lying flat on the floor in front of them they will draw horizontal lines with the swing of the arm, if the board be placed upright they draw nearly perpendicular lines merely as the weight of the arm carries the chalk down. With pencil and paper they make nothing but scrawling zig-zags with no method in their madness, and no amount of copy set or guiding of their hands will induce them to do otherwise. They have, however, a decided sense of color. Both of them have been taught to know red, blue and yellow by name and the chimpanzee can select and place in separate piles blocks colored violet, blue, green, yellow, orange and red.

In testing their color sense I tried first with a red, a blue and a yellow block and a board whereon were painted squares of the same colors a little larger than the blocks; I showed them over and over again what I wanted them to do and saying the names of the colors

as I placed the blocks on the squares correspondingly colored. Then a block was given to them and they were expected to place it correctly, but it never was done in a way to convince me that they recognized the color. Next they were tested with pieces of ribbon of exactly the same length and width and luster; I endeavored to get them to select and hand to me the color that I asked for. For a month or more I thought that they knew the colors, but to make sure I placed the ribbons in another room and told one of the apes to go and bring me one of the colors, and while she was getting it I kept repeating the name of the color so that she should not forget. This was a complete failure, again and again. They evidently had been reading my expression and the direction of my eyes, when, sitting opposite to them, unconsciously, I followed the direction of their hesitating hands with a glance of approval or disapproval. This was really very observant on their part, but not to the point. They were completely at a loss when I closed my eyes and held out my hand to receive the color that I had asked for.

This did not prove, however, that they could not recognize the different colors; merely that they did not know them by name. The next trial therefore was with 24 blocks, 8 red, 8 blue, 8 yellow; all scattered over the table. One color was called for by name and if that was selected rightly then all the others of that color must be picked out and placed in my hand. I would never accept a wrong color, but would either close my hand or snap it out of their fingers; the lesson would not stop until all the eight blocks of each color had been rightly selected, so they gradually learned that a quick selection of right colors meant a speedy release to play. In this manner also they learned the names of the colors as applied to blocks, but if other red, blue and yellow objects such as ribbons were placed among the blocks I could never get the apes to consider them in the same category as the blocks merely because they were of the same color. When the chimpanzee knew the three colors distinctly both by name and by sight a new set of twenty-four was given to her, but this time there were four each of violet, blue, green, yellow, orange and red. It was decidedly unexpected to find that she readily appreciated the difference of these new tints and at the end of the first lesson was able to build up all the blocks in separate colors, although the tone

of coloring of the green and the blue, and the yellow and the orange were very much the same. My chimpanzee, at least, has an appreciation of color distinct from tone.

Actions which on first thought would seem to require almost human intelligence such as stringing beads, threading a needle, using a spoon, or a fork, drinking out of a cup, washing the hands, etc., our anthropoid cousins seem to accomplish with great facility. Possibly these are but slight modifications of instinctive actions of use in the pursuit of food, or to satisfy a natural curiosity. A twig or a stick may be poked into a hole to pry out a grub or the kernel of a nut, a drink of water out of the hollow of a leaf is like drinking from a cup; sticky juice of fruit on their hands they naturally find may be counteracted by a good rubbing in sand or water, therefore, I do not think that such actions demonstrate any marked degree of mentality. But tying a knot in which three or four different motions were required and where no object other than the formation of a knot was attained, required long and persistent instruction. The knot was tied hundreds of times while the ape was apparently closely observing every action and then her hands were put through the motions but yet she would only twist one end of the rope round the other when left to herself. Simple actions such as digging with a spade, or trowel, scrubbing, sweeping, screwing in a screw she learned entirely by imitation.

I am eager to be able to say truthfully that my anthropoids have showed signs of reasoning (I mean have deduced an inference from certain premises), but truthfully I can say that I have seen only the faintest rays of evidence, unless association of ideas which in point of fact is merely learning by experience, is reasoning. The chimpanzee if given the key to the closet in her room will fit it in the lock, turn it in the right direction, slip back the little spring catch, open the door, get the top of the spigot which is kept there to avoid a waste of water, fit the top of the spigot, get a drink of water and finally turn the water off. It appears as if in this act there were a sequence of ideas concerted to accomplish a purpose and therefore to a certain extent there were reasoning. I am inclined to think, however, that such an act with the chimpanzee is governed by a simple succession of ideas rather than by a pre-arranged sequence

of actions, with a definite object in view. It would seem that the inability to compare one object with another or one action with another precludes their mind from either deductive or inductive reasoning, and that their brains are as incapable of reasoning as we do, as a dog's paw (for instance) is incapable of holding a pen as we do. They undoubtedly can be taught, owing to their physical resemblance, to imitate human actions to a remarkable degree, but their highest notch of mentality after four or five years of training is hardly comparable to that of a human child of a year and a half. Rev. Sydney Smith in the introduction to one of his lectures on moral philosophy says:

"There may, perhaps, be more of rashness and ill-fated security in my opinion, than of magnanimity or liberality; but I confess I feel myself so much at my ease about the superiority of mankind—I have such a marked and decided contempt for the understanding of every baboon I have yet seen—I feel so sure that the blue ape without a tail will never rival us in poetry, painting and music—that I see no reason whatever, why justice may not be done to the few fragments of soul and tatters of understanding which they may really possess. I have sometimes, perhaps, felt a little uneasy at Exeter 'Change from contrasting the monkeys with the 'prentice boys who are teasing them; but a few pages of Locke, or a few lines of Milton, have always restored me to tranquility."

I regret that I am forced to admit, after my several years observation of the anthropoid apes, that I can produce no evidence that might disturb the tranquil sleep of the reverend gentleman.

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